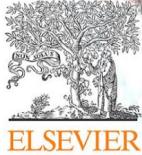




Handbook of PEDIATRIC DENTISTRY

Edited by: Angus C. Cameron | Richard P. Widmer

Fifth Edition



Handbook of Pediatric Dentistry

Handbook of Pediatric Dentistry

Edited by

**ANGUS C. CAMERON, BDS (Hons), MDSC,
FDSRCS (Eng), MRACDS (Paed), FRACDS, FICD, FADI**

Specialist in Private Practice

Paediatric Dentistry

Sydney

Visiting Associate Professor

University of Newcastle (AUS)

Charles Sturt University (NSW) and the University of Leeds (UK)

NSW

Australia

**RICHARD P. WIDMER, BDSc (Hons), MDSc (Melb),
FRACDS, FICD**

Paediatric Dentist and Head, Department of Dentistry

Sydney Children's Hospital Network - Children's Hospital at Westmead (CHW),
Westmead, Sydney

Clinical Associate Professor, CHW, Clinical School, the Children's Hospital,
Faculty of Medicine and Health,

University of Sydney

Senior Consultant

Children's Hospital at Westmead

NSW

Australia



ELSEVIER

For additional online content visit ExpertConsult.com

ELSEVIER

© 2022, Elsevier Limited. All rights reserved.

HANDBOOK OF PEDIATRIC DENTISTRY, FIFTH EDITION

First edition 1997

Second edition 2003

Third edition 2008

Fourth edition 2013

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or any information storage and retrieval system, without permission in writing from the publisher. Details on how to seek permission, further information about the Publisher's permissions policies and our arrangements with organizations such as the Copyright Clearance Center and the Copyright Licensing Agency, can be found at our website: www.elsevier.com/permissions.

This book and the individual contributions contained in it are protected under copyright by the Publisher (other than as may be noted herein).

Notices

Practitioners and researchers must always rely on their own experience and knowledge in evaluating and using any information, methods, compounds or experiments described herein. Because of rapid advances in the medical sciences, in particular, independent verification of diagnoses and drug dosages should be made. To the fullest extent of the law, no responsibility is assumed by Elsevier, authors, editors, or contributors for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions, or ideas contained in the material herein.

ISBN: 978-0-7020-7985-6

Printed in India

Last digit is the print number: 9 8 7 6 5 4 3 2 1

Original cover painting by Amelia Rose Reidy age two and a half

Content Strategist: Alexandra Mortimer

Content Development Specialist: Veronika Watkins

Project Manager: Umarani Natarajan

Publishing Services Manager: Shereen Jameel

Design: Patrick Ferguson

Illustration Manager: Narayanan Ramakrishnan



Working together
to grow libraries in
developing countries

www.elsevier.com • www.bookaid.org

CONTENTS

Foreword vii

Preface viii

Contributors x

Acknowledgements xiii

Contributors to previous editions xiv

- 1 The philosophy of paediatric dentistry: What is paediatric dentistry? 1
Richard P. Widmer ■ Angus C. Cameron
- 2 Child development, relationships and behaviour management 14
Richard P. Widmer ■ Daniel W. McNeil ■ Cheryl B. McNeil
- 3 Pharmacological behaviour management 29
Eduardo A. Alcaino ■ Benjamin Moran
- 4 Dental caries 56
Svante Twetman
- 5 Fluoride and dental health 73
Yasmin O. Crystal ■ John Featherstone
- 6 Restorative paediatric dentistry 89
Nicola Innes ■ Mark Robertson ■ Clement Seeballuck ■ Mariana Pinheiro Araujo
- 7 Pulp therapy for primary and immature permanent teeth 130
Erin Mahoney ■ Angus C. Cameron
- 8 Clinical and surgical techniques 152
Angus C. Cameron ■ Stephen Fayle
- 9 Trauma management 183
Angus C. Cameron ■ Richard P. Widmer ■ Marc Semper ■ Andrew A.C. Heggie ■ Paul Abbott
- 10 Paediatric oral medicine, oral pathology and radiology 241
Anastasia Georgiou ■ Angus C. Cameron ■ Richard P. Widmer
- 11 Dental anomalies 306
Mike Harrison ■ Angus C. Cameron ■ Richard P. Widmer
- 12 Management of medically compromised paediatric patients 368
Marcio A. da Fonseca ■ Evelina Kratunova
- 13 Children with special needs 435
Neeta Prabhu ■ Wendy J. Bellis ■ Angus C. Cameron
- 14 Management of cleft lip and palate 460
Julia Dando
- 15 Speech, language and swallowing 477
Sarah Starr

APPENDICES

A Blood and serum testing and investigations 488
Angus C. Cameron ■ Richard P. Widmer ■ Benjamin Moran ■ Mark Schifter

B Paediatric life support 492
Angus C. Cameron ■ Richard P. Widmer

C Management of anaphylaxis 494
Angus C. Cameron ■ Richard P. Widmer ■ Benjamin Moran

D Management of acute asthma 497
Angus C. Cameron ■ Richard P. Widmer ■ Benjamin Moran

E Fluid and electrolyte balance 500
Angus C. Cameron ■ Richard P. Widmer ■ Benjamin Moran

F Antibiotic prophylaxis protocols for the prevention of infective endocarditis 505
Angus C. Cameron ■ Richard P. Widmer ■ Benjamin Moran

G Glasgow Coma Scale 509
Angus C. Cameron ■ Richard P. Widmer ■ Benjamin Moran

H Common drugs usage in paediatric dentistry 510
Angus C. Cameron ■ Richard P. Widmer ■ Benjamin Moran

I Radiography in children 515
Johan Aps

J Ethics in paediatric dentistry 523
Richard Steffen

K Somatic growth and maturity 527
Angus C. Cameron ■ Richard P. Widmer ■ Benjamin Moran

L Growth charts 531
Angus C. Cameron ■ Richard P. Widmer ■ Benjamin Moran

M Eruption dates of teeth 537
Angus C. Cameron ■ Richard P. Widmer ■ Benjamin Moran

N Construction of family pedigree 540
Angus C. Cameron ■ Richard P. Widmer ■ Benjamin Moran

O Calculating fluoride values for dental products 541
Angus C. Cameron ■ Richard P. Widmer ■ Benjamin Moran

P COVID-19 and paediatric dentistry 542
Stephen Fayle

The philosophy of paediatric dentistry: What is paediatric dentistry?

Richard P. Widmer ■ Angus C. Cameron

CHAPTER OUTLINE

What is paediatric dentistry?

Patient assessment: history

- Current complaints
- Dental history
- Medical history
- Pregnancy (obstetric) history
- Growth and development
- Current medical treatment
- Family and social history

Examination

- Extraoral examination
- Intraoral examination

Occlusion and orthodontic relations

- Dental relationships
- Molar relationship
- Incisor relationship

Special examinations

- Radiography and other imaging
- Pulp sensibility testing

Blood investigations

Microbiological investigations

Anatomical pathology

Photography

Diagnostic casts

Caries activity tests

Steps in diagnosis

Assessment of disease risk

- Low risk of disease
- Moderate risk
- High risk or future high risk
- Treatment plan

Clinical conduct

- Infection control
- Recording of clinical notes
- Consent for treatment
- Special notes regarding oral healthcare for children in the hospital setting

What is paediatric dentistry?

Paediatric dentistry is a specialty based not on a particular skill set, but rather encompassing all dentistry's technical skills against a philosophical background of understanding child development in health and disease. This latest edition of the handbook emphasizes again the broader picture in treating children (Appendix J). A dental visit is no longer just a dental visit; it should be regarded as a 'health visit'. We are part of the team of health professionals who contribute to the well-being of children, both in an individual context and at the wider community level. Children often slip through childhood to adolescence seemingly in the blink of an eye, and family life is more pressured and demanding. Commonly, children spend more time on social media than



Figure 1.1 The dental visit should be a positive experience. Children with special needs may present different challenges in their care; however, their involvement and joy are the greatest reward.

interacting directly with family and friends, and more than ever, the major influences on their lives come from outside the family.

The pattern of childhood illness has changed, and, with it, clinical practice. Children presenting for treatment may have survived cancer, may have a well-managed chronic disease or may have significant behavioural and learning disorders (Figure 1.1). There are increasing, sometimes unrealistic, expectations among parents/carers that the care of their children should be easily and readily accessible and pain-free and result in flawless aesthetics.

Caries and dental disease should be seen as reflective of the family's social condition, and the dental team should be part of the community.

Your [patients] don't have to become your friends, but they are part of your social context and that gives them a unique status in your life. Treat them with respect and take them seriously and your practice will become to feel part of the neighbourhood, part of the community.

(HUGH MACKAY, PSYCHOLOGIST, SOCIAL RESEARCHER AND NOVELIST)

In the evolving dynamics of dental practice, we feel that it is important to change, philosophically, the traditional 'adversarial nature' of the dental experience. It is well recognized that for too many, the dental experience has been traumatic. This has resulted in a significant proportion of the adult population accessing dental care only episodically, for the relief of pain. Thus, it is vital to see a community, and consumer, perspective in the provision of paediatric dental services. The successful practice of paediatric dentistry is not merely the completion of any operative procedure but also ensuring a positive dental outcome for the future oral health behaviour of that individual and family. To this end, an understanding of child development – physical, cognitive and psychosocial – is paramount. The clinician must be comfortable and skilled in talking to children, and interpersonal skills are essential.

Patient assessment: history

A clinical history should be taken in a logical and systematic way for each patient and should be updated regularly. Thorough history-taking is a skill. It may be time consuming and requires practice. However, it is an opportunity to get to know the child and family. Furthermore, the history facilitates the diagnosis of many conditions, even before the clinical examination. There are often specific questions pertinent to a child's medical history that will be relevant to their management, thus it is desirable that parents be present. The understanding of medical conditions that can compromise treatment is essential, and this will be expanded on in later chapters. Be aware that the parent(s) or carer(s) may be unaware of the full medical and/or social history of the child. This may be the case in those children who are adopted or are the offspring of differing social arrangements.

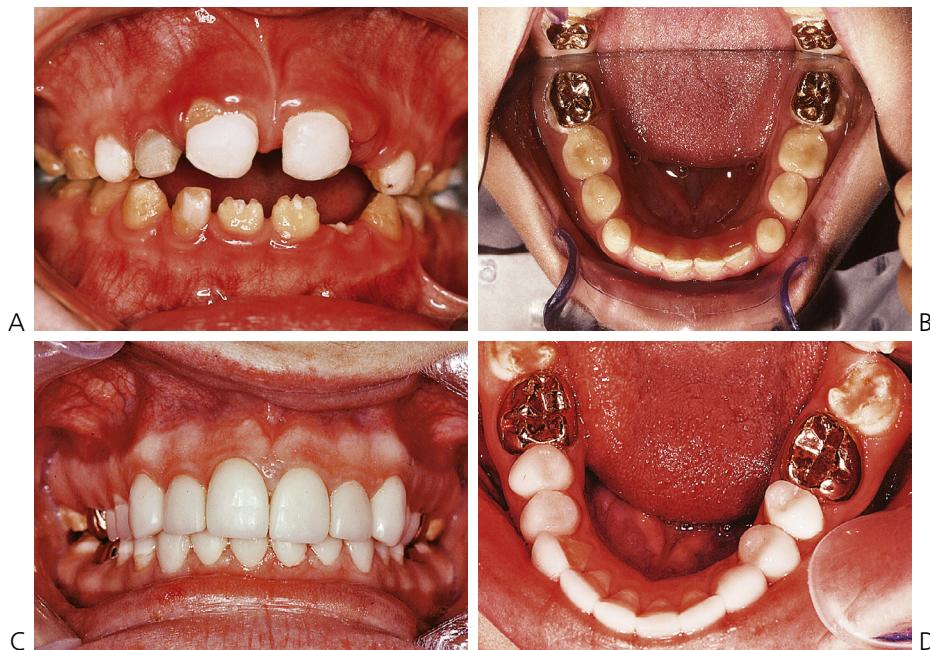


Figure 11.37 (A) Not all cases using composite resin are successful. With progressive eruption of the teeth, it is difficult for the patient to keep the gingival margins clean and the restoration may therefore fail. (B) Cast gold onlays are useful to protect the occlusal surfaces. No preparation of the crown was performed. (C, D) Onlays, veneers and composite crowns were cemented with composite luting cement.

possible, but it is difficult to predict how useful this information would be to an affected individual or family. Counselling may be helpful in some circumstances, provided it is given by someone with the appropriate training.

CLINICAL HINTS: BONDING TO ABNORMAL ENAMEL

- Acid-etch composite resin seems to bond more successfully to hypoplastic enamel than to hypomineralized enamel.
- In severely affected dentitions, it is preferable to place preformed metal crowns on primary molar teeth very early (e.g., at around 3–4 years of age) to preserve the vertical dimension and allow maximal eruption of the first permanent molar.
- Cast metal (precious or base-metal) onlays on suitable permanent posterior teeth have the best long-term clinical success.
- Regular radiographic examination is required to detect early caries.

Disorders of dentine

DENTINOGENESIS IMPERFECTA (OMIM 125490) (Figure 11.38)

Dentinogenesis imperfecta is an inherited disorder of dentine, which may or may not be associated with osteogenesis imperfecta. The term 'hereditary opalescent dentine' is sometimes used for the isolated condition. Both osteogenesis imperfecta and dentinogenesis imperfecta are transmitted as autosomal dominant traits and are clinically indistinguishable dentally, although they have a different genetic basis. Osteogenesis imperfecta is caused by mutations in the type I collagen



Figure 11.38 Manifestations of dentinogenesis imperfecta. (A) Dentinogenesis imperfecta. Dark discolouration of the crowns which appear normal in size and shape. (B) Severe attrition in the primary dentition in a case of dentinogenesis imperfecta. (C) Blue sclera associated with osteogenesis imperfecta. (D) Primary dentition in a child with osteogenesis imperfecta.

genes (e.g., *COL1A1*, *COL1A2*) and dentinogenesis imperfecta to mutations in the dentine sialophosphoprotein I gene (*DSPP*). Some individuals and families with osteogenesis imperfecta may have clinical evidence of dentinogenesis imperfecta, but in other families there may be variable expression of the trait. Within these families, some individuals may have abnormal dentine, while others are clinically unaffected as far as the teeth are concerned. However, because of the same collagen defect, all such children with osteogenesis imperfecta may have abnormal dentine, albeit at a subclinical level. The possibility of osteogenesis imperfecta should be considered in children presenting with dentinogenesis imperfecta and investigated by measurement of bone density if necessary. The presence of blue sclera or a history of bone fractures should alert the clinician to osteogenesis imperfecta.

Dental manifestations

- Amber, grey to purple-bluish discolouration or opalescence (Figure 11.38).
- Pulpal obliteration (Figure 11.39).
- Relatively bulbous crowns.
- Short, narrow roots.
- Enamel may be lost after tooth eruption, exposing the soft dentine, which rapidly wears. This is probably because of inherent weakness in the dentine rather than because of an enamel defect or abnormality at the dentinoenamel junction.
- Mantle dentine appears normal.
- Circumpulpal dentine is poorly formed with abnormal direction of tubules. Small soft tissue inclusions represent remnants of pulpal tissue.

primary teeth (*Continued*)
pulp medicaments, 140
pulpotomy, indications for, 140
technique, 140
restorative dentistry. *See* restorative dentistry
role of, 131
splinting, 192
trauma sequelae, 205f, 206
primary root apex displacement, 204, 204f
treatment options for, 149t

primary teeth, pulpotomy in
therapeutic agents used for, 142
electrosurgery, 143
ferric sulphate, 142
formocresol, 143
mineral trioxide aggregate, 142

probond, 540

procedure timing, 23

profound dehydration, 502

proliferation disorders, 316

propofol, 51

prosthesis, cleft lip and/or palate, 475

protective clothing, 23

prothrombin time (PT), 373

provisional diagnosis, 7, 10

proximal sealants, 127

pseudohypoparathyroidism, 416

psychiatrists, 27

psychologists, 27

psychostimulant medication, ADHD, 438

pubertal growth spurt, 529

pubertal voice, 529

puberty, 529

pulmonary atresia, 370

pulmonary disease, 425

pulmonary stenosis, 372

pulp capping, 138
direct pulp capping, 139
immature permanent teeth, 139
primary teeth, 139
indications, 138
indirect pulp capping, 138
technique, 138

pulp extirpation, inflammatory root resorption, 229

pulp necrosis, 132, 134f, 145, 148
intrusion, 224

primary incisor crown fractures, 202

primary teeth
discolouration, 205f, 206
root fractures. *See* root fractures

pulp regeneration, 213, 214f

pulp sensibility testing, 9, 135
complicated crown fractures, 209
luxation, permanent dentition, 224
trauma, 191

pulp sensibility tests, 135

pulp status, clinical investigations to determine, 135

pulp therapy, 130–131, 136, 138, 142–143,
145–146, 148
clinical assessment and general considerations,
131

pulp therapy (*Continued*)
chronic infection and irreversible pulpitis,
signs and symptoms of, 134
clinical investigations to determine pulp
status, 135
irreversible pulpitis, 132
coronal seal, 137
current practice, evidence for, 131
endodontics versus extraction in immature
permanent teeth, 148
first permanent molar extraction, orthodontic
considerations for, 148
follow-up, 150
timing of extractions, 148
grossly carious/necrotic immature permanent
teeth, treatment planning for, 145
immature permanent tooth, pulpotomy in, 146
clinical criteria, 147
technique, 147

primary teeth, decision to retain/restore/extract,
136
behavioural considerations, 136
contraindications, 136
dental considerations, 137
indications, 136
medical considerations, 136

primary teeth, role of, 131
anatomical and morphological considerations
in, 131
space maintenance, 131

pulp capping, 138
direct pulp capping, 139
indications, 138
indirect pulp capping, 138
technique, 138

pulpectomy in primary teeth, 143
indications for pulpectomy in primary teeth, 145
obturation, 145
root canal morphology, 143
technique, 145

pulpotomy in primary teeth, 139, 140f
caries removal, 139
Cvek. *See* Cvek pulpotomy
final tooth restoration, 140
haemostasis, 139
indications for, 140
pulp medicaments, 140
technique, 140
therapeutic agents used for, 142
electrosurgery, 143
ferric sulphate, 142
formocresol, 143
mineral trioxide aggregate, 142

pulp vitality testing. *See* pulp sensibility testing

pulpal status, assessment of, 132t

pulpectomy in primary teeth, 139, 143
general technical considerations, 143
obturation, 145
root canal morphology, 143
indications for pulpectomy in primary teeth, 145
technique, 145